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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/828,626	04/21/2004	Neelesh B. Mehta	MERL-1563	5827

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MITSUBISHI ELECTRIC RESEARCH LABORATORIES, INC.
201 BROADWAY
8TH FLOOR
CAMBRIDGE, MA 02139

EXAMINER	
LAI, DANIEL	
ART UNIT	PAPER NUMBER
2617	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/828,626	MEHTA ET AL.	
	Examiner	Art Unit	
	DANIEL LAI	2617	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *07 July 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-10 and 12-14* is/are rejected.

7)☒ Claim(s) *11,15 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

Response to Arguments

Applicant's arguments with respect to claims 1-16 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made

in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 6-10 and 12-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rudrapatna (US 2002/0132600 A1) in view of Kuchi et al. (US 6,542,556 B1, hereinafter Kuchi), and further in view of Walton et al. (US 2003/0235147 A1, hereinafter Walton).

Regarding claims 1 and 8, Rudrapatna discloses a method and a system for transmitting an input stream of symbols in a multiple-input/multiple-output wireless communications system including M subgroups of transmitting antennas (Abstract, where Rudrapatna discusses plurality groups of antennas and transmission using MIMO mode). Rudrapatna discloses selecting, according to channel conditions of the MIMO wireless system, L subgroups of them subgroups of antennas, and each of the L subgroups of antennas includes a set of at least two antennas (Abstract, paragraphs 20 and 24, where Rudrapatna discusses each antenna subgroups activation based on channel characteristics and each antenna subgroups includes at least two pairs of antennas). Rudrapatna further discloses MIMO transmission and transmitting using two selected groups of antennas to transmit signals via MIMO mode in combination with diversity, and suggests Space Time Transmit Diversity (STTD) (paragraphs 5 and 11), but does not teach explicitly the details of demultiplexing the input stream into L substreams, there being one substream for each one of the L selected subgroups of at least two antennas, adaptively modulating and coding each of L substreams to a maximum data rate while achieving a predetermined performance on an associated channel used to transmit the substream, STTD encoding each of the L coded substreams into a set of at least two output streams, there being one output stream for each antenna in the set of at least two antennas of each one of the L subgroups of antennas. In an analogous art, Kuchi discloses demultiplexing the input stream into L substream, there being one substream for each one of L selected subgroups of

antenna (col. 6, line 60-67). Kuchi discloses adaptively modulating and coding each of the L substreams to a data rate while achieving a predetermined performance on an associated channel used to transmit the substream (col. 2, line 20-30; col.6, line 48-55). Kuchi discloses STTD encoding each of the L coded substreams into a set of output streams, there being one output stream in each set for each antenna of each one of the L subgroups of antennas (col. 7,line 3-12). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the method of MIMO transmission with the demultiplexing and encoding steps and apparatus as disclosed by Kuchi to divide the input stream into different streams and to encode the substreams in order to prepare the substreams for the subgroups of antenna to transmit the signal. The references also lack adaptively modulating and coding each of L substreams to a maximum data rate while achieving a predetermined performance on an associated channel used to transmit the substream. In a similar field of endeavor, Walton discloses performing coding and modulating to achieve maximum data rate (paragraphs 51-59). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the method and system of MIMO transmission disclosed by Rudrapatna in view of Kuchi to modulate the data streams to achieve a maximum data rate as disclosed by Walton in order to avoid lower data rate which causes to interfere or corrupt data. The references do not specify L<M, however, Rudrapatna discloses the antenna array of the present invention is not limited to two-pair antenna groups and to two-group antenna arrays. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to modify the antenna array of the MIMO transmission method as disclosed by Rudrapatna in view of Kuchi and Walton to have L<M subgroups of antenna in order to have more M subgroups of antenna to be selected.

Regarding claims 2 and 3, Rudrapatna in view of Kuchi and Walton discloses the limitations of claim 1 as applied above. Rudrapatna does not teach using feedback information to determine

channel condition and selecting coding scheme based on the feedback information. Walton discloses selecting coding scheme using feedback information received (paragraph 51). Using feedback information received to determine a coding scheme allows a transmitter to perform transmission based on network condition and therefore increase transmission efficiency. It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the MIMO transmission method as disclosed by Rudrapatna to take feedback information into consideration to select a specific coding scheme as disclosed by Walton in order to increase overall transmission efficiency and performance. The references fail to specify the feedback information is SINR. However, determining signal quality by using parameters such as SNR, SINR or RSSI has been well known in the art. One with ordinary skill in the art would recognized that SINR can be used in the method of MIMO transmission disclosed by Rudrapatna in view of the method of using feedback information to determine a coding scheme as disclosed by Walton as the feedback information. It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the feedback information as disclosed by Walton with an SINR value as it is a matter of engineering design choice.

Regarding claim 4, the combination above discloses the limitations of claim 1, and Rudrapatna in view of Kuchi further discloses the modulation and coding depends on the number of L of the substreams (Kuchi, col. 7, lines 28-37).

Regarding claims 6, 7 and 12, the combination above discloses the limitations of claim 1. Rudrapatna does not teach interleaving each coded substream and symbol mapping each interleaved substream and demultiplexing each output stream into a plurality demultiplexed output streams; multiplying each of the plurality of demultiplexed output streams by an orthogonal variable spreading factor; adding the demultiplexed output streams, for each output stream, after

multiplication into a summed output stream corresponding to each output stream; and multiplying each summed output stream by a scrambling code. Rudrapatna also lacks performing the adaptively modulating and coding and the STTD encoding in parallel and independently for each substream. Walton discloses coded data is interleaved and further modulated (i.e., symbol mapped) (paragraph 38) and demultiplexing each output stream into a plurality demultiplexed output streams; multiplying each of the plurality of demultiplexed output streams by an orthogonal variable spreading factor; adding the demultiplexed output streams, for each output stream, after multiplication into a summed output stream corresponding to each output stream; and multiplying each summed output stream by a scrambling code (paragraphs 89-92; Fig. 5). Walton discloses coding and modulation are processed independently in parallel (paragraphs 52-54). It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the method and system of MIMO transmission disclosed by Rudrapatna in view of Kuchi to modulate the data streams to achieve a maximum data rate as disclosed by Walton in order to avoid lower data rate which causes to interfere or corrupt data.

Regarding claims 9 and 10, the combination above discloses the limitations of claim 1. Rudrapatna does not teach Alamouti method of simultaneously transmitting signals. Kuchi discloses performing Alamouti transformation and simultaneously transmitting the output of the transformation via two groups of antenna (col. 6, lines 6-35). In view of MIMO transmission scheme using two groups of antennas where each group comprises at least two pairs of antennas, data rate would increase. It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the MIMO transmission scheme as disclosed by Rudrapatna to perform Alamouti transformation method as disclosed by Kuchi to transmit plurality of signal during a single signal period in order to increase transmission data rate (Kuchi, col. 2, lines 5-15).

Regarding claim 13, Rudrapatna further discloses the number of selected antennas is at least 2L (Abstract, paragraphs 20 and 24, where Rudrapatna discloses each group comprises at least 2 antennas).

Regarding claim 14, Rudrapatna in view of Kuchi and Walton discloses the claimed invention except for the performance is a maximal system capacity. It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the MIMO transmission method as disclosed by Rudrapatna in view of Kuchi and Walton to achieve a maximal system capacities, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Rudrapatna in view of Kuchi and Walton as applied to claim 1 above, and further in view of Kim (US 2003/0103474 A1).

Rudrapatna in view of Kuchi and Walton discloses the limitations of claim 1 as applied above. The references do not disclose decreasing the number of antenna to increase system efficiency. In an analogous art, Kim discloses interference is proportional to number of antennas (paragraph 28). Therefore, reducing number of antenna or channel will reduce interference and increase efficiency. It would have been obvious to one having ordinary skill in the art at the time of the invention to modify the method for MIMO transmission disclosed by Rudrapatna in view of Kuchi and Walton to reduce the number of channels disclosed by Kim such that interference can be reduced and hence system efficiency can be increased.

Allowable Subject Matter

Claims 11, 15 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Katz et al. (US 2003/0076787 A1) discloses MIMO data transfer method.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL LAI whose telephone number is (571)270-1208. The examiner can normally be reached on Monday-Thursday 9:00 AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lester Kincaid can be reached on (571)272-7922. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. L./
Examiner, Art Unit 2617

/Lester Kincaid/

Supervisory Patent Examiner, Art Unit 2617